

Marriage of ROMEO and JULIeT

IceCube Collaboration Meeting in Berkeley

Mar. 20, 2005

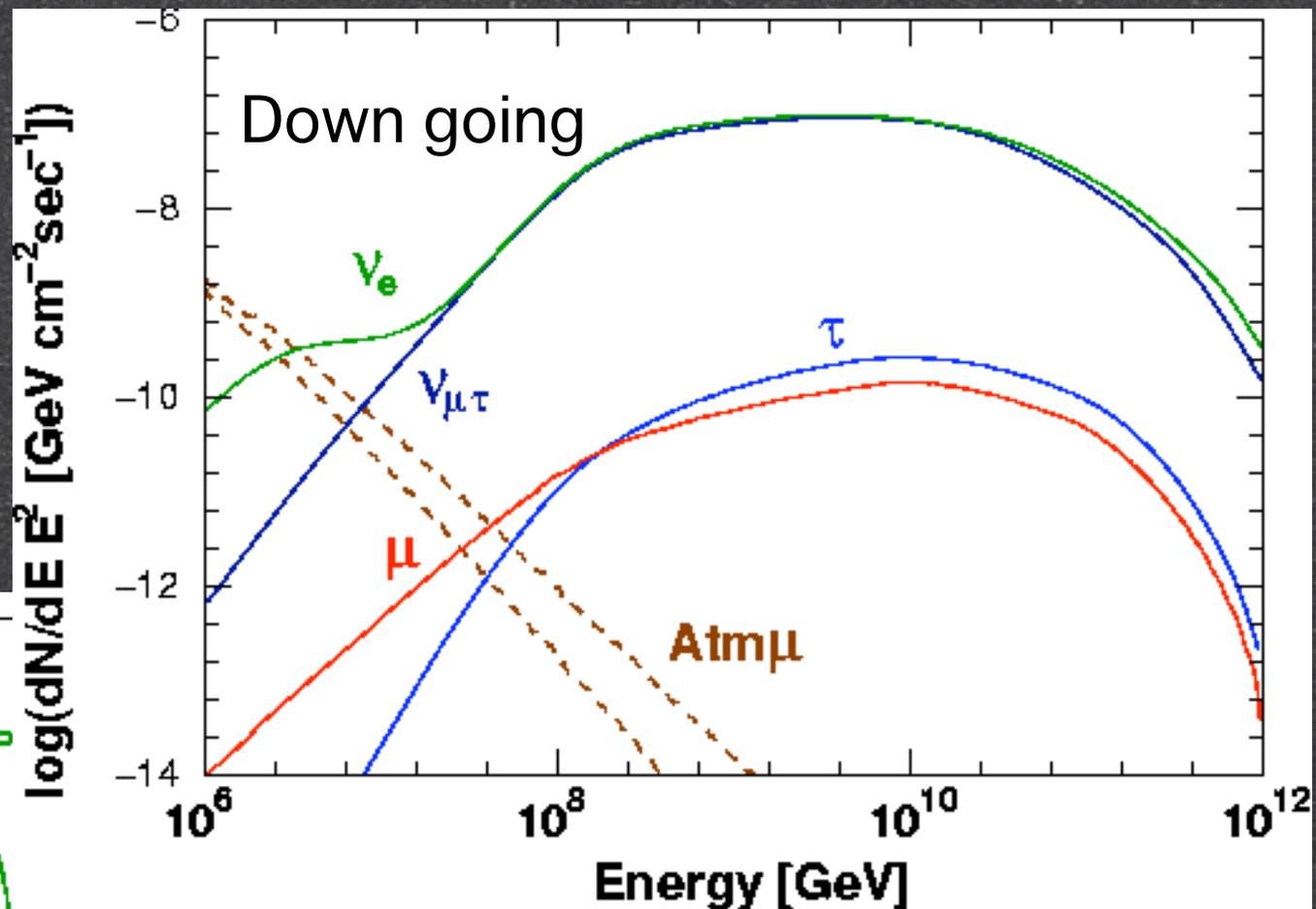
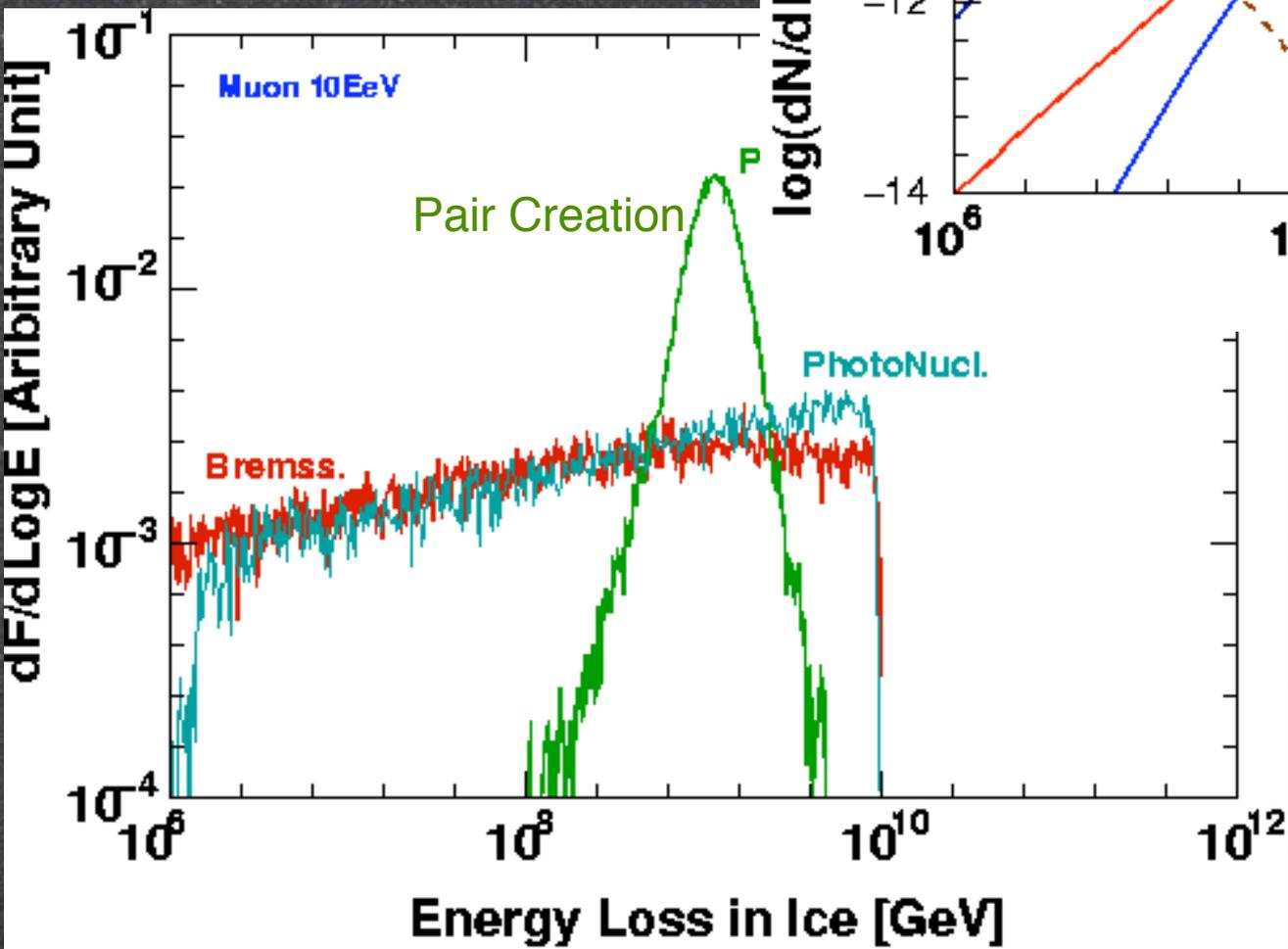
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- ROMEO meets JULIeT!
- Manual mode
- Swing mode
- Summary

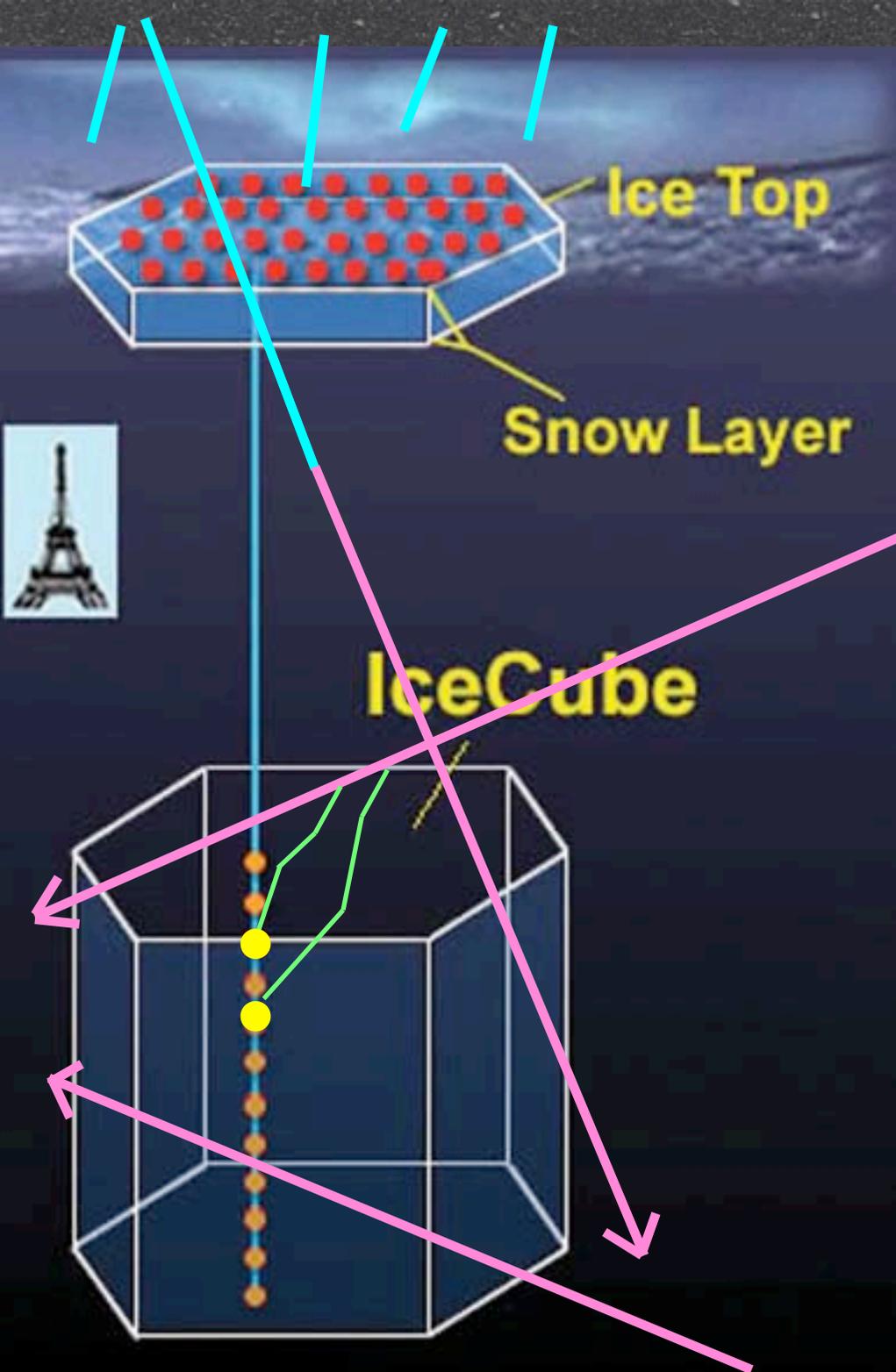
JULeT

Java-based Ultra high energy Leptons IntEgral Transportor



Published in Phys. Rev. D

S.Yoshida, R.Ishibashi,
H.Miyamoto, PRD 69 103004
(2004)



Simulation procedure: JULieT meets ROMEO!

Corsika
not yet.

Manual mode
done!
Swing mode
done!

JULieT

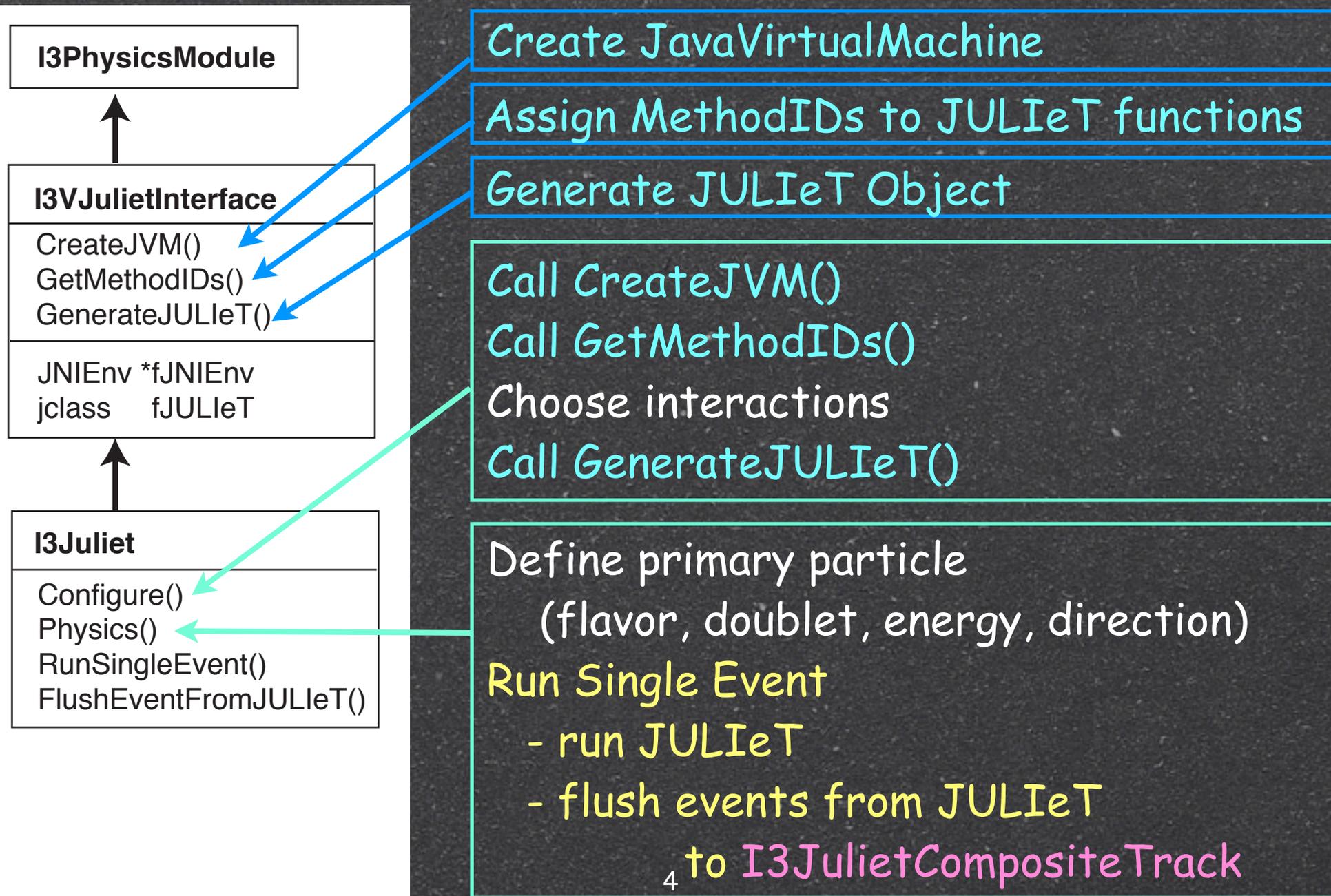
C++ interface
"13Juliet"

photonics

ROMEEO

JULieT meets ROMEO!

Manual mode:

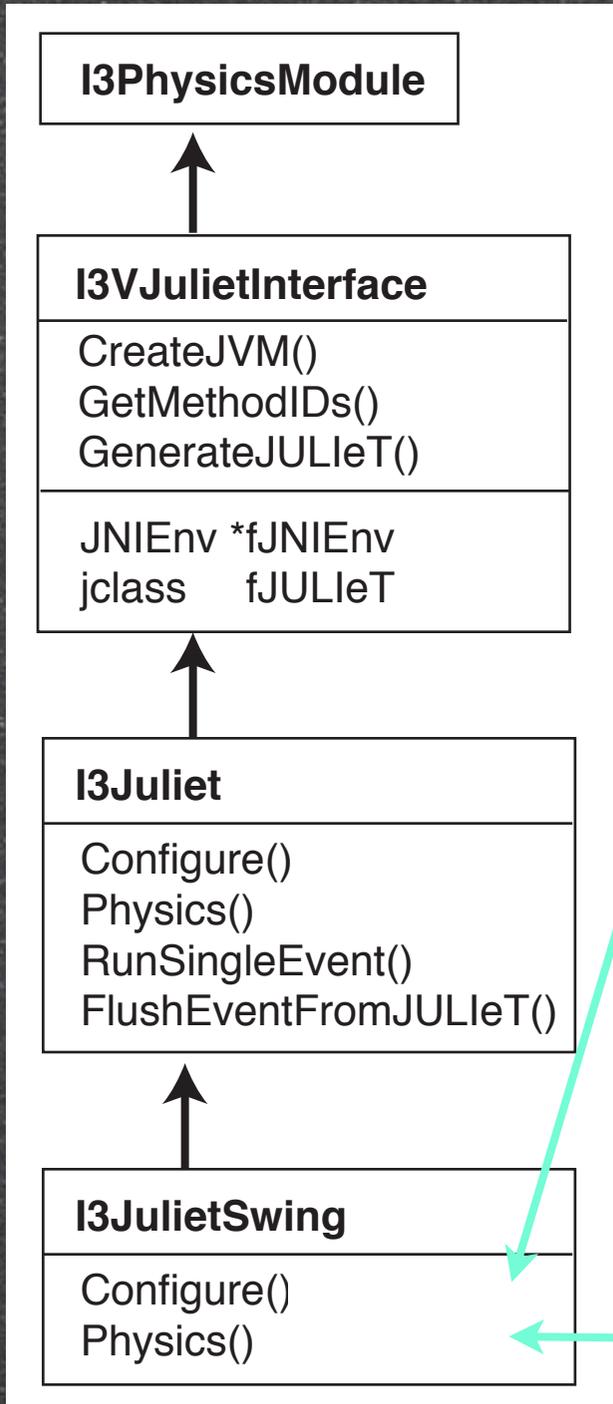


Example script of manual mode : sss_juliet.C

```
tray.AddModule("I3Juliet", "propagate");
....

tray.SetParameter("propagate", "MaterialID", 0); // [ice, rock]=[0, 1]
tray.SetParameter("propagate", "Flavor", 1); // [e, mu, tau]=[0, 1, 2]
tray.SetParameter("propagate", "Doublet", 1); // [neutral, charged]=[0, 1]
tray.SetParameter("propagate", "Energy", 1.0e8); // [GeV]
tray.SetParameter("propagate", "DoChargedCurrent", 0);
tray.SetParameter("propagate", "DoNeutralCurrent", 0);
tray.SetParameter("propagate", "DoMuBremss", 1);
tray.SetParameter("propagate", "DoTauBremss", 0);
tray.SetParameter("propagate", "DoMuKnockOn", 0);
tray.SetParameter("propagate", "DoTauKnockOn", 0);
tray.SetParameter("propagate", "DoMu2ePairCreation", 0);
tray.SetParameter("propagate", "DoTau2ePairCreation", 0);
tray.SetParameter("propagate", "DoMu2muPairCreation", 0);
tray.SetParameter("propagate", "DoTau2muPairCreation", 0);
tray.SetParameter("propagate", "DoMu2tauPairCreation", 0);
tray.SetParameter("propagate", "DoTau2tauPairCreation", 0);
....
```

Swing (GUI interface for JAVA) Mode



Call CreateJVM()

Call GetMethodIDs()

Generate Swing object

-> Ready to choose particle, energy, direction and interactions via Swing

@ Swing window, you have to ...

- Generate interactions matrix
- Run single event

I3JulietSwing::Physics() waits to call FlushEventFromJULIeT() until the Swing + JULIeT finishes all calculation to propagate an event

300PeV Tau simulated by Swing + JULeT

JULeT

Select Particle



tau Flavor
log (Energy [GeV]) 8.5
Nadir [Deg] 70.0
Azimuth [Deg] 0.0
X in ice3 [cm] 0.0
Y in ice3 [cm] 0.0
Z in ice3 [cm] 0.0

Particle Propaty

Tau Mass 1.7841[GeV] Energy 3.1622776601683795E8[GeV]

Select Interaction

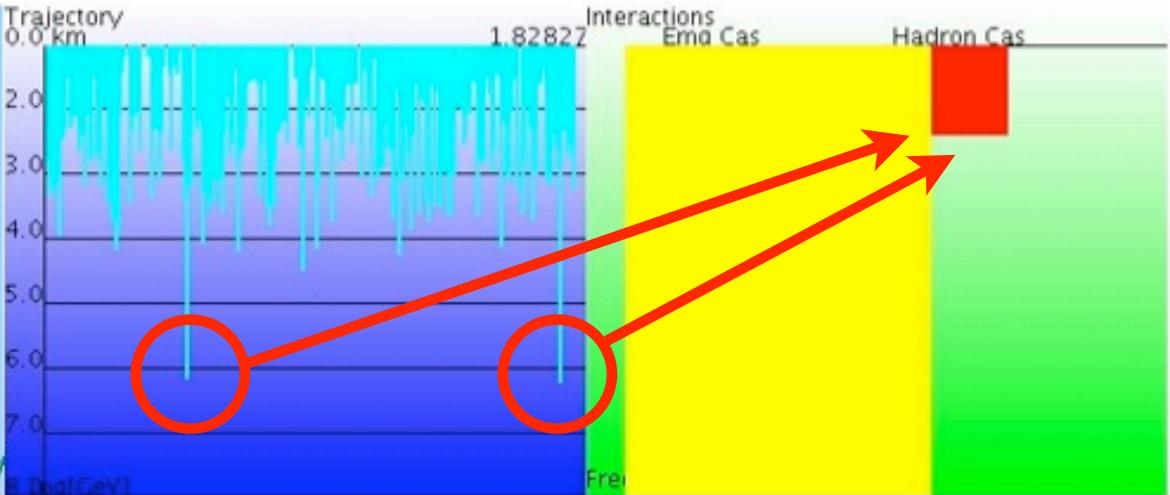
nu CC nu NC mu/tau decay
 mu Bremss tau Bremss mu Knock-on tau Knock-on
 mu e+e- tau e+e- mu Photo-nucl tau Photo-nucl

Step1: Generate Interactions
Step2: Run the Particle ...

Message Display

Energy Deposit 3641553.9012676845[GeV]
100%

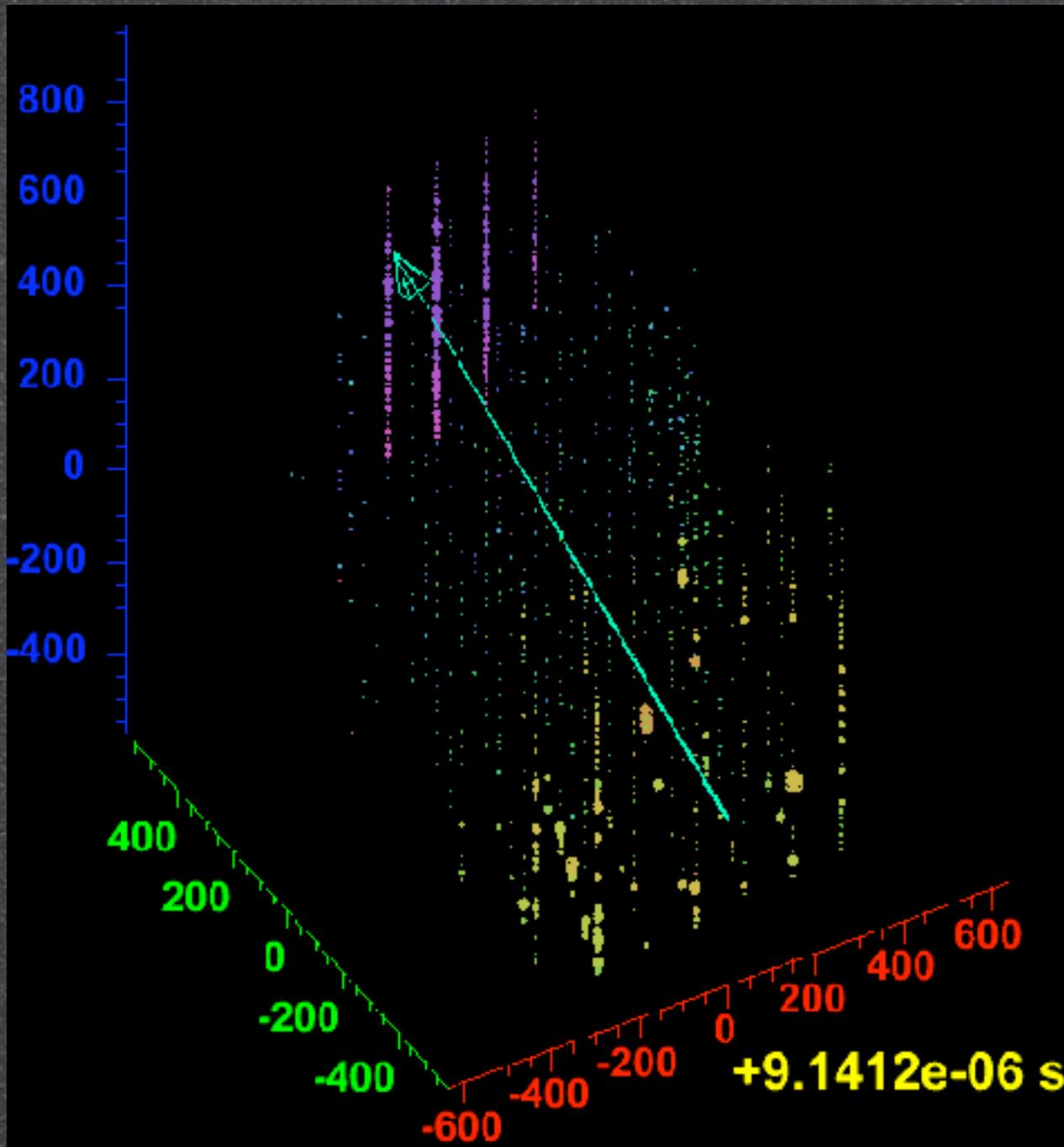
Event Display



Running a JULeT event....
IceCube
version 2.0 (March 2005)
<http://www.ppl.phys.chiba-u.jp/JULeT/>

MC OMHits of 300PeV tau (IceTray)

JULIeT package
is now integrated
into the IceTray!



JULieT also simulates from given primary particles

- Corsika++ ----> Coming soon!
- Data classes which stores other particles like UHE neutrino
 - ex. I3JulietSource for GZK leptons
 - inherit from I3Primary?
 - inherit from I3InIceParticle?
 - other candidate?

Summary

- "ROMEO" and "JULIeT" did happy marriage!
- Both Swing mode and Manual mode is working
- Starting from given primary will be implemented soon

Web Site

<http://www.ppl.phys.chiba-u.jp/JULIeT/>

<http://www.ppl.phys.chiba-u.jp/ROMEO/>



END